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### (54) GUIDE MECHANISM FOR A PACKAGING MACHINE

FÜHRUNGSEINRICHTUNG FÜR EINE VERPACKUNGSMASCHINE

MECANISME DE GUIDAGE POUR MACHINE D'EMBALLAGE

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**WO-A-93/11928**

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## Descripti n

### Backgr und of the Invention

[0001] This invention relates to packaging cartons and is more particularly concerned with feeding such cartons in collapsed condition from a hopper and for initiating and then completing a set up operation of cartons in sequence.

[0002] US 4 881 934 illustrates a rotary transfer mechanism which has a carrier means rotatable with a drive shaft on a support member. A support shaft is provided which is rotatable on the carrier means and includes a suction cup for receiving a carton which is caused to follow a path and thereafter, to be placed on a conveyor. Fixed guide rails provided adjacent the conveyor: the rails are curved in such a manner to permit placement of the carton on the lug conveyor and hold the carton in position on the conveyor.

[0003] A problem associated with using fixed guides is that they are required to be positioned to avoid the path of the feeder mechanism as the carton is being placed onto the conveyor. Furthermore, the use of fixed guides is undesirable when a force is required to be applied to the carton to guide it to a preferred position on the conveyor.

[0004] An alternative approach to supporting the carton during carton set up is illustrated in US 5 102 385. This document shows a feeder mechanism for setting up cartons including a rotating suction cup which is moveable inwardly and outwardly on a slidable rod. The suction cup mechanism includes a leaf spring clip to engage and hold a carton down following deposit thereof on a conveyor. Thus, the feeder mechanism is required to have leaf spring clips attached to each suction cup assembly which increases the complexity of the mechanism which is undesirable.

[0005] In order to increase the packaging speeds of equipment, it is preferred to position the cartons on a conveyor as quickly as possible so that conveying speeds are improved. A further problem associated with known feeder mechanisms is that the shape of the carton in its set up form may have an undesirable impact on packaging speeds. For example, a pizza box usually comprises large top and bottom panels and relatively narrow side panels. If a carton of this shape is fed onto a conveyor by using suction cup means known in the art, then the relatively large surface area of the box results in a carton which is difficult to control. Thus, the positioning of such a carton onto a conveyor by known means makes the alignment of a carton between lugs difficult: one result being that packaging speeds may need to be reduced.

### Summary of the Invention

[0006] The present invention seeks to overcome or at least mitigate the problems outlined above and associ-

ated with the prior art. It is envisaged that the present invention can be used with various other types of packaging machine. Alternatively, the erecting mechanism of the present invention can be sold as an individual module to be fitted to new equipment or to existing equipment on a retro fit basis.

[0007] One aspect of the invention provides an apparatus for manipulating out of a hopper sequential collapsed sleeve type end loading cartons having oppositely disposed face contacting panels and for initiating set up thereof into open ended condition, the apparatus comprising a rotatable shaft, carton pick up means for sequentially engaging one of said face contacting panels and for withdrawing from the hopper the collapsed carton which includes one of the face contacting panels, a rotatable elongate support rod having one end thereof secured to said shaft and on the other end of which said carton pick up means is disposed, wherein said carton pick means is arranged to deposit a set up carton on a conveyor characterised in that oscillatable guide means is disposed outside the path of orbital movement of said carton pick up means to engage and hold said carton down following or during deposit thereof on said conveyor.

[0008] According to an optional feature of this aspect of the invention, the oscillatable guide means may be oscillated by driving means interconnected to said oscillatable means by a driving link.

[0009] According to another optional feature of this aspect of the invention, the oscillating guide means may comprise an oscillatable arm moveable in a plane substantially parallel to said conveyor wherein said oscillatable arm includes a guide surface to guide said carton into a position between leading and trailing lugs mounted on the conveyor. Preferably, the guide surface is moveable in a path interrupting the path of orbital movement of said carton pick up means.

[0010] According to a further optional feature of this aspect of the invention, the oscillating arm may include a second guide surface adjacent said first guide surface. The first guide surface may apply a force to the carton to guide the carton in said position, and thereafter the second guide surface may apply a second force to align the carton in said position. Preferably the second force may be greater than the force applied by the first guide surface.

[0011] Another aspect of the invention provides a device in a packaging machine for aligning a carton to a position between leading and trailing lugs on a conveyor which device comprises an oscillatable arm disposed above the conveyor and including a first guide surface to guide the carton into said position, wherein the first guide surface is moveable in a plane substantially parallel to said conveyor.

[0012] According to an optional feature of either aspect of the invention, the oscillating arm may include a second guide surface adjacent the first guide surface, wherein the first guide surface applies a force to said

carton to guide said carton into said position, and thereafter the second guide surface applies a second force to accurately align said carton in the position. Preferably, the second force may be greater than the force applied by the first guide surface.

[0013] An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings in which:

FIGURE 1 is a perspective view of a carton suitable for use with the machine according to the invention;

FIGURE 2 is a perspective view of the infeed of a packaging machine illustrating the feed mechanism and oscillating guide means of this invention; and

FIGURES 3 to 8 are perspective views and side profiles of the infeed end of the machine illustrating the erection of a carton in accordance with a preferred embodiment of the invention.

#### Detailed Description of the Preferred Embodiment

[0014] A mechanism according to an aspect of the present invention is capable of storing and feeding a variety of carton types, for example wraparound or fully enclosed cartons. Any reference in this specification to carton type includes different sizes of any particular carton style.

[0015] Referring to the drawings, one example of the carton 10 to be used in conjunction with a mechanism of the preferred embodiment is shown in Figure 1 in a set up condition ready for receiving foodstuff, for example a pizza. The carton 10 is formed from a unitary blank of paperboard or other foldable sheet material and includes opposed side wall panels 12, 14 and opposed end wall panels 16, 18 hingeably connected one to next. The carton further comprises top panel 20 and base panel 22 hingeably connected to opposed edges of side walls 12, 14. An article, for example a pizza, can be inserted into the carton from one side and the end panels 16, 18 are then secured together to provide a fully enclosed carton.

[0016] It is envisaged that the cartons will vary depending upon the shape and or quantity of articles to be packaged and accordingly, a machine in accordance with the present invention is adjustable in numerous respects so that it can process a wide variety of such cartons, for example sleeve type cartons used in the bottling industry.

[0017] Referring now to Figure 2 of the drawings, there is shown a machine 30 for processing cartons of the type outlined above. The upstream end of the machine includes a hopper (not shown) or other suitable means for storing the carton in which a multiplicity of cartons 10 in a collapsed condition are held ready for processing. Preferably, a rotary vacuum feeder 32 is positioned adjacent the hopper. In this embodiment, a pa-

per feed chain 34 (or conveyor) is provided to transfer cartons downstream to a loading station (not shown). The conveyor 34 includes leading and trailing lugs 36, 38, 36A, 38A, well known in the art, which engage the cartons as they are moved downstream.

[0018] The feeder mechanism 32 includes a main shaft 40 rotatable about a fixed axis. The shaft 40 is generally supported at its end by a suitable bearing structure but which is conventional and which is mounted to a side frame. Suitable driving mechanism, for example a servo motor is provided to rotate the shaft 40.

[0019] For withdrawing the lower most collapsed carton from the first hopper, a carton pick up means 42 is provided, including three suction cups 44 which are each supported on cup holders 46 and a frame 48. The cup holder frames 48 are fixedly mounted respectively on elongate support rods 50. In one class of embodiments, the rods 50 are slidably mounted respectively on a collar structure (not shown), which collar structure is rigidly secured to the main rotatable shaft 40. The frames 48 may be mounted onto cam rods (not shown) extending into the side frame housing a cam track (not shown). The purpose of the cam track would be to facilitate the cam rods to be extended away from the main shaft 40 so that the suction cups 44 would come into contact with the carton 10 thereby to remove one of the cartons from the hopper and to rotate the carton in a uniform path to the paper feed chain 34.

[0020] In this embodiment, it is envisaged that a vacuum break is provided in the feeder mechanism 32 which is used in conjunction with a vacuum supply to set the vacuum connection and cut off points thereby determining the length of time and/or for the distance through which the carton is held by the feeder mechanism 32. As illustrated in Figures 2 and 3, five sets of carton pick up means 42 are provided in association with the main rotatable shaft 40. Only one set of such devices such as those indicated at 42 are described in detail because all five sets of pick up means are of the same construction and operate in an identical fashion.

[0021] As illustrated in Figures 2 and 3 4, oscillatable guide means 52 is positioned outside the path of orbital movement of the suction cups 44. The oscillatable guide means 52 comprises a first arm 54 and preferably, a second arm 56 connected to driving means, for example eccentric driving means or a servo motor, by a driving link 58. In this embodiment, the first arm 54 is substantially "L" shaped with a portion 60 being positioned adjacent to and spaced from the conveyor. Portion 60 is provided with first and second guide surfaces 62, 64 positioned one to next in an angular relationship. The second arm 56 is spaced from the first arm 54 and is of same construction and operates in an identical fashion, so it is not described in any greater detail. As shown in Figure 2, each arm 54, 56 is moveable in the space between adjacent suction cups 44.

[0022] Whilst the use of a rotary vacuum feeder to supply cartons to the conveyor is preferred, it is envis-

aged that the present invention can be used or adapted to be used with other types of feeder mechanisms without departing from the scope of the invention.

[0023] Further, the present invention is not limited to guiding a carton being fed onto a conveyor. For example, the oscillating arm can be placed at a loading station, if it is desired to apply a downward or positive force to the carton during loading to improve carton stability. Indeed, it is envisaged the invention can be used at any position in a packaging machine where it is required to guide a carton to a position to apply a downward or positive force to the carton to stabilize or to re-align it.

[0024] In use, the feeder mechanism 32 continuously and sequentially feeds cartons from the hopper to the paper feed chain 34 by the main shaft 40 rotating the pick up means 42 in the direction indicated by the arrow A, shown in Figure 4. As the pick up means 42 rotates, the suction cups 40 are moved into contact with a top wall of the carton 10. A vacuum is then applied to the set of suction cups 44, by the vacuum supply. Thus, the carton 10 is withdrawn from the hopper and then transferred to the paper feed chain 34. The vacuum is maintained during this transfer stage so that the suction cups 44 hold the top wall 20 of the carton 10. When the carton is deposited at the paper feed chain 34, the vacuum break disconnects the vacuum supply from the suction cups 44 to release the carton. In this embodiment shown in Figures 3 and 4, the suction cups 44 hold the carton towards its leading edge 66 to prevent unwanted movement as the leading edge 66 comes into contact with the leading lug 36 or 36A hereinafter described.

[0025] The erection of the carton is now described by reference to Figures 3 to 8. In Figure 4, the lead edge 66 of a carton is moved towards the leading lug 36A mounted on the conveyor 34, which is moving forward in direction "A". The arms 54, 56 are synchronously moved in direction "X" away from the carton, to enable the carton to continue on an unimpeded path towards the conveyor 34.

[0026] Figure 5 shows the next stage, where the leading edge 66 is in contact with the leading lug 36A and the arms 54, 56 in a fully retracted position. The carton continues to move forward relative the conveyor 34 and leading lug 36A and carton set up is initiated by the top and bottom walls being separated by the leading lug 36A, by means known in the art and illustrated in Figure 6. For example, abutment of the loading edge 66 with the leading lug 36A, causes the top and bottom walls 20, 22 to move apart, because the carton continues to advance relative the leading lug 36A. At this stage, the arms 54, 56 are moved in the opposite direction "Y", and the top panel 20 comes into contact with the first guide surface 62.

[0027] As the carton continues to move forward by the feeder, the first guide surface 62, moves the carton in a downward direction "C". The arms 54, 56 continue to move in direction "Y", and the first guide surface 62 moves out of contact with the carton and the second

guide surface 64 becomes operative, as shown in Figure 7. The second guide surface pushes downward on the rear end portion 68 of the carton as the arm 54, 56 move in direction "Y" to stabilize and/or guide the carton. Thereafter, the trailing lug 38A comes into contact with the rear side wall 14 of the carton to complete the set up of the carton. At the same time, the oscillating guide means continues to move in direction "Y" and aligns the rear portion of the carton on the conveyor as shown in Figure 8.

[0028] As the carton moves downstream on the conveyor and is held in place by the leading and trailing lugs 36, 38, 36A, 38A and a pair of fixed guides 70 shown in Figure 8. The oscillating arms 54, 56 are reversed in direction and move back to the retracted position shown in Figure 4, so that a second carton can be received by the conveyor. Thus, the process of carton set up and positioning on a conveyor is repeated, which is usually a continuous process in a packaging machine.

[0029] It is envisaged that the arms 54, 56 could include only one guide surface to guide and/or align carton being set up without departing from the scope of the invention.

According to this invention the speed of operation of the apparatus is improved as well as its efficiency and durability as the carton is moved from a collapsed position to a fully set up condition.

[0030] While the preferred embodiment described herein is to be used with packaging machines for loading pizzas into cartons, it will be recognised that the invention is not paperboard "bricks" and other containers into cartons. Moreover, while the preferred embodiment described herein is shown as part of a machine for loading containers into horizontally-loaded sleeve-type carton, the invention is not limited to cartons of this type.

[0031] It will be understood that the feeder and/or guide mechanism of the invention has been illustrated with reference to a specific embodiment and that numerous modifications are possible within the scope of the invention.

## Claims

1. An apparatus (30) for manipulating out of a hopper sequential collapsed sleeve type end loading cartons (10) having oppositely disposed face contacting panels (20, 22) and for initiating set up thereof into open ended condition, said apparatus (30) comprising a rotatable shaft (40), carton pick up means (32) for sequentially engaging one of said face contacting panels (20) and for withdrawing from the hopper the collapsed carton which includes said one of said face contacting panels (20), a rotatable elongate support rod (50) having one end thereof secured to said shaft (40) and on the other end of which said carton pick up means (42) is disposed, wherein said carton pick means (42) is

arranged to deposit a carton (10) on a conveyor (34) **characterized in that** oscillatable guide means (52) is disposed outside the path of orbital movement of said carton pick up means (42) to engage and hold said carton down following or during deposit thereof on said conveyor (34).

2. An apparatus as claimed in claim 1 wherein said oscillatable guide means (52) is oscillated by driving means interconnected to said oscillatable means by a driving link (58).
3. An apparatus as claimed in claim 1 or claim 2, wherein said oscillating guide means (52) comprises an oscillatable arm (54) moveable in a plane substantially parallel to said conveyor (34) wherein said oscillatable arm includes a guide surface (62) to guide said carton into a position between leading and trailing lugs (36, 38, 36A, 38A) mounted on said conveyor.
4. An apparatus as claimed in claim 3, wherein said guide surface (62) is moveable in a path interrupting the path of orbital movement of said carton pick up means (42).
5. An apparatus as claimed in claim 3 or claim 4 wherein said oscillating arm (54) includes a second guide surface (64) adjacent said first guide surface (62), wherein said first guide surface applies a force to said carton to guide the carton into said position, and thereafter said second guide surface applies a second force to align the carton in said position.
6. An apparatus as claimed in claim 5, wherein said second force is greater than the force applied by the first guide surface (62).
7. A device in a packaging machine for aligning a carton to a position between leading and trailing lugs (36, 38, 36A, 38A) on a conveyor (34) which device comprises an oscillatable arm (54) disposed above said conveyor and including a first guide surface (62) to guide said carton into said position, wherein said first guide surface is moveable in a plane substantially parallel to said conveyor (34).
8. A device as claimed in claim 7, wherein said oscillating arm (54) includes a second guide surface (64) adjacent said first guide surface (62), wherein said first guide surface applies a force to said carton to guide the carton into said position, and thereafter said second guide surface applies a second force to align the carton in said position.
9. A device as claimed in claim 8, wherein said second force is greater than the force applied by said first guide surface (62).

10. A packaging machine incorporating the apparatus of any of claims 1 to 6 or the device of claims 7 to 9.

## 5 Pat ntsprüche

1. Vorrichtung (30), um aufeinanderfolgende zusammengefaltete, stirnseitig zu befüllende Schachteln (10) des Röhrentyps aus einem Magazin zu bearbeiten, wobei die Schachteln gegenüberliegende, in flächenberührender Beziehung angeordnete Wandflächen (20, 22) aufweisen, und um die Aufrichtung davon in den offenendigen Zustand einzuleiten, wobei die Vorrichtung (30) eine drehbare Achse (40) umfasst, eine Schachtel-Aufnahmeeinrichtung (32), um der Reihe nach eine der in flächenberührender Beziehung angeordneten Wandflächen (20) in Eingriff zu nehmen und um dem Magazin die zusammengefaltete Schachtel zu entnehmen, die jene mit den in flächenberührender Beziehung angeordneten Wandflächen (20, 22) einschließt, sowie eine drehbare längliche Stützstange (50), deren eines Ende an der Achse (40) befestigt ist und an deren anderem Ende die Schachtel-Aufnahmeeinrichtung (42) angeordnet ist, wobei die Schachtel-Aufnahmeeinrichtung (42) derart angeordnet ist, um eine Schachtel (10) auf eine Förderanlage (34) abzustellen, **dadurch gekennzeichnet, dass** eine schwingbare Führungseinrichtung (52) außerhalb der Bahn der Kreisbewegung der Schachtel-Aufnahmeeinrichtung (42) angeordnet ist, um die Schachtel in Eingriff zu nehmen und nach oder während des Abstellens davon auf der Förderanlage (34) niederzuhalten.
2. Vorrichtung nach Anspruch 1, wobei die schwingbare Führungseinrichtung (52) durch eine Antriebseinrichtung zum Schwingen gebracht wird, die mit der schwingbaren Einrichtung durch ein Antriebsglied (58) verbunden ist.
3. Vorrichtung nach Anspruch 1 oder Anspruch 2, wobei die schwingbare Führungseinrichtung (52) einen schwingbaren Arm (54) umfasst, der in einer zu der Fördereinrichtung (34) im Wesentlichen parallelen Ebene beweglich ist, wobei der schwingbare Arm eine Führungsfläche (62) einschließt, um die Schachtel in eine Position zwischen den auf der Förderanlage befestigten führenden und nachlaufenden Nasen (36, 38, 36A, 38A) zu führen.
4. Vorrichtung nach Anspruch 3, wobei die Führungsfläche (62) in einer Bahn, welche die Bahn der Kreisbewegung der Schachtel-Aufnahmeeinrichtung (42) unterbricht, beweglich ist.
5. Vorrichtung nach Anspruch 3 oder Anspruch 4, wobei der schwingbare Arm (54) eine zweite an die

- erste Führungsfläche (62) angrenzende Führungsfläche (64) einschließt, wobei die erste Führungsfläche eine Kraft auf die Schachtel aufbringt, um die Schachtel in Position zu führen, und wobei die zweite Führungsfläche anschließend eine zweite Kraft aufbringt, um die Schachtel in Position zu halten.
6. Vorrichtung nach Anspruch 5, wobei die zweite Kraft größer ist als die Kraft, die von der ersten Führungsfläche (62) aufgebracht wird.
7. Vorrichtung in einer Verpackungsmaschine, zum Ausrichten einer Schachtel in eine Position zwischen den führenden und nachlaufenden Nasen (36, 38, 36A, 38A) auf einer Fördereinrichtung (34), wobei die Vorrichtung einen schwingbaren Arm (54) umfasst, der oberhalb der Fördereinrichtung angebracht ist und eine erste Führungsfläche (62) einschließt, um die Schachtel in Position zu führen, wobei die erste Führungsfläche in einer zur Fördereinrichtung (34) im Wesentlichen parallelen Ebene beweglich ist.
8. Vorrichtung nach Anspruch 7, wobei der schwingbare Arm (54) eine zweite an die erste Führungsfläche (62) angrenzende Führungsfläche (64) einschließt, wobei die erste Führungsfläche eine Kraft auf die Schachtel aufbringt, um die Schachtel in Position zu führen, und wobei die zweite Führungsfläche anschließend eine zweite Kraft aufbringt, um die Schachtel in Position zu halten.
9. Vorrichtung nach Anspruch 8, wobei die zweite Kraft größer ist als die Kraft, die von der ersten Führungsfläche (62) aufgebracht wird.
10. Verpackungsmaschine beinhaltend die Vorrichtung eines der Ansprüche 1 bis 6 oder die Vorrichtung nach den Ansprüchen 7 bis 9.
- posé à l'autre extrémité de celle-ci, ledit moyen d'interception (42) de carton étant agencé pour déposer un carton (10) sur un convoyeur (34), **caractérisé en ce qu'un** moyen de guidage oscillant (52) est disposé à l'extérieur du trajet de mouvement orbital dudit moyen d'interception (42) de carton pour saisir et retenir ledit carton à la suite ou au cours du dépôt de celui-ci sur ledit convoyeur (34).
2. Dispositif selon la revendication 1, dans lequel ledit moyen de guidage oscillant (52) est amené à osciller par un moyen d'entraînement relié audit moyen oscillant par une biellette d'entraînement (58).
3. Dispositif selon la revendication 1 ou la revendication 2, dans lequel ledit moyen de guidage oscillant comporte un bras oscillant (54) mobile dans un plan sensiblement parallèle audit convoyeur (34), ledit bras oscillant comportant une surface de guidage (62) servant à guider ledit carton jusque dans une position entre des pattes avant et arrière (36, 38, 36A, 38A) montées sur ledit convoyeur.
4. Dispositif selon la revendication 3, dans lequel ladite surface de guidage (62) est mobile sur un trajet interrompant le trajet de mouvement orbital dudit moyen d'interception (42) de carton.
5. Dispositif selon la revendication 3 ou 4, dans lequel ledit bras oscillant (54) comporte une seconde surface de guidage (64) adjacente à ladite première surface de guidage (62), ladite première surface de guidage exerçant sur ledit carton une force servant à guider le carton jusque dans ladite position, puis ladite seconde surface de guidage exerce une seconde force pour aligner le carton dans ladite position.
6. Dispositif selon la revendication 5, dans lequel ladite seconde force est supérieure à la force appliquée par la première surface de guidage (62).

## Revendications

1. Dispositif (30) servant à manipuler à la sortie d'une trémie des cartons aplatis successifs (10) du type manchons à chargement par les extrémités, ayant des panneaux (20, 22) disposés de façon opposée avec des faces en contact, et pour commencer à mettre ceux-ci en forme jusqu'à ce qu'ils soient dans un état avec les extrémités ouvertes, ledit dispositif (30) comprenant un arbre rotatif (40), un moyen d'interception (32) de carton destiné à venir successivement contre l'un desdits panneaux (20) à faces en contact et à retirer de la trémie le carton aplati qui comporte ledit panneau (20) à face en contact, une première extrémité d'une tige rotative allongée de support (50) étant fixée audit arbre (40), ledit moyen d'interception (42) de carton étant dis-
7. Dispositif dans une machine d'emballage pour aligner un carton dans une position entre des pattes avant et arrière (36, 38, 36A, 38A) sur un convoyeur (34), lequel dispositif comprenant un bras oscillant (54) disposé au-dessus dudit convoyeur et comportant une première surface de guidage (62) servant à guider ledit carton jusque dans ladite position, ladite première surface de guidage étant mobile dans un plan sensiblement parallèle audit convoyeur (34).
8. Dispositif selon la revendication 7, dans lequel ledit bras oscillant (54) comporte une seconde surface de guidage (64) adjacente à ladite première surface de guidage (62), ladite première surface de guidage

exerçant sur ledit carton une force servant à guider le carton jusque dans ladite position, puis ladite seconde surface de guidage exerçant une seconde force pour aligner le carton dans ladite position.

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9. Dispositif selon la revendication 8, dans lequel ladite seconde force est supérieure à la force appliquée par ladite première surface de guidage (62).

10. Machine d'emballage comportant le dispositif selon l'une quelconque des revendications 1 à 6 ou le dispositif selon les revendications 7 à 9.

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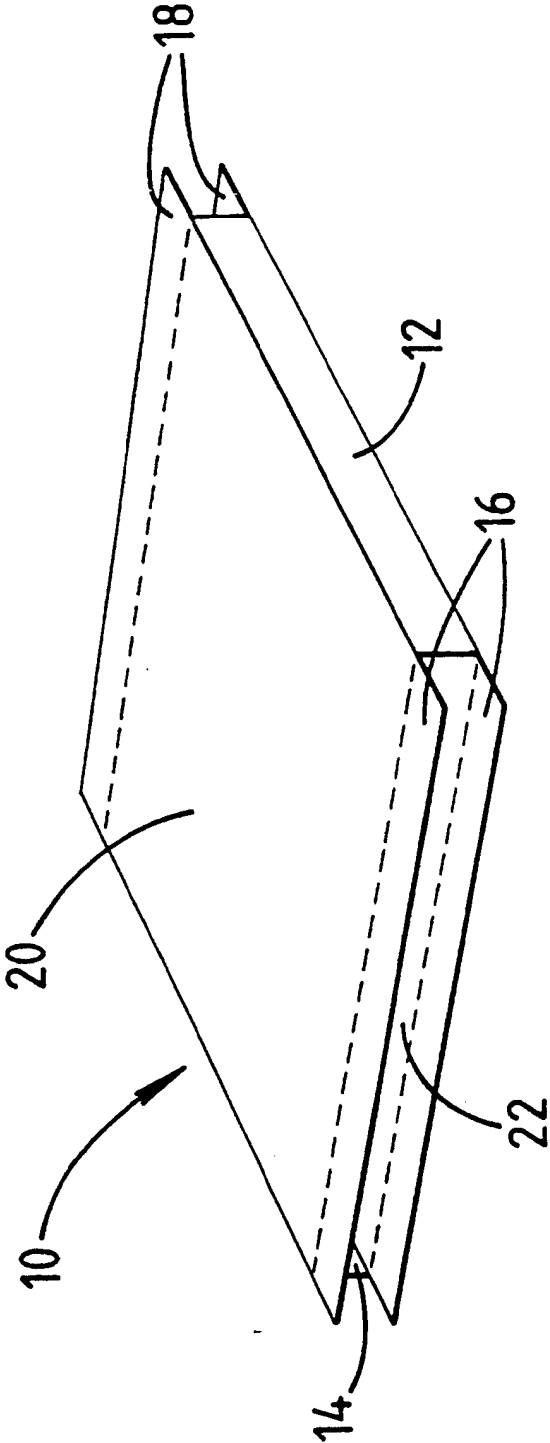
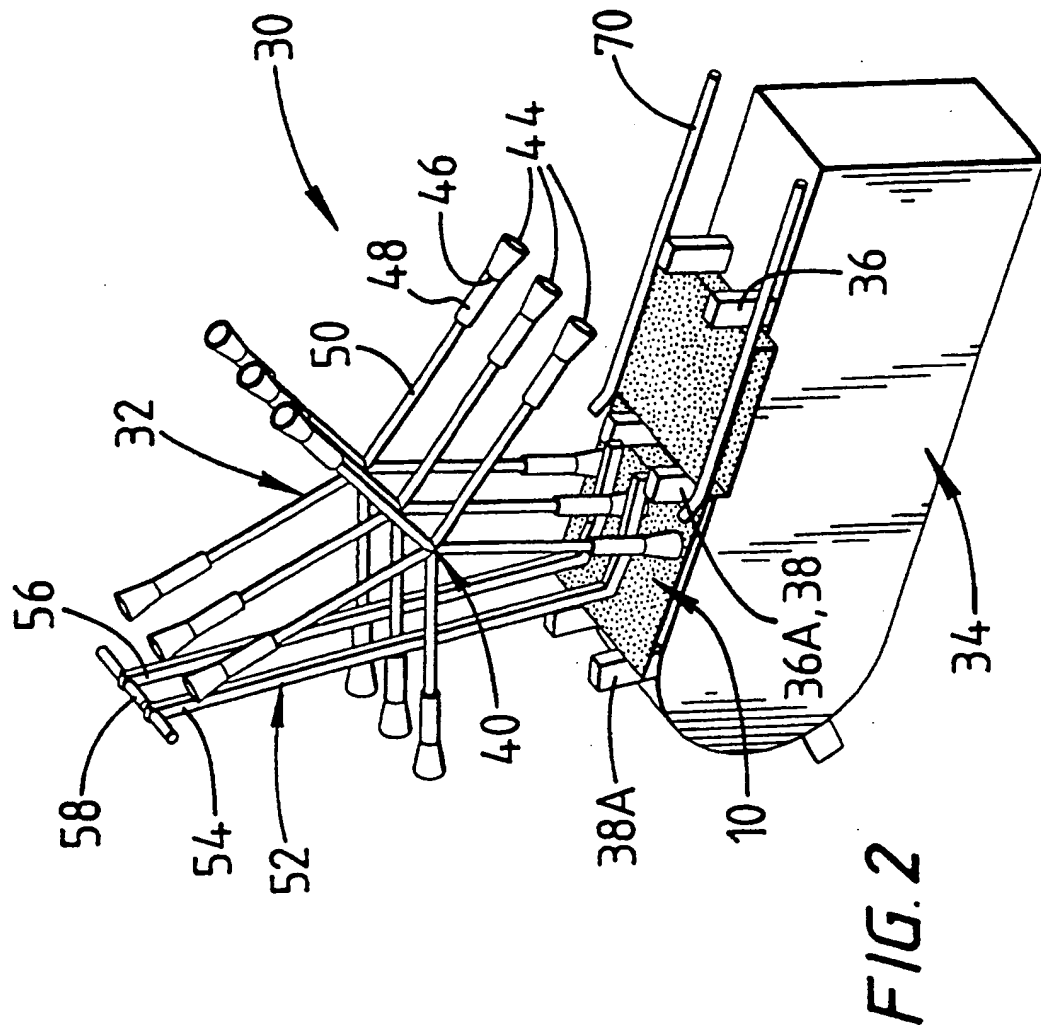
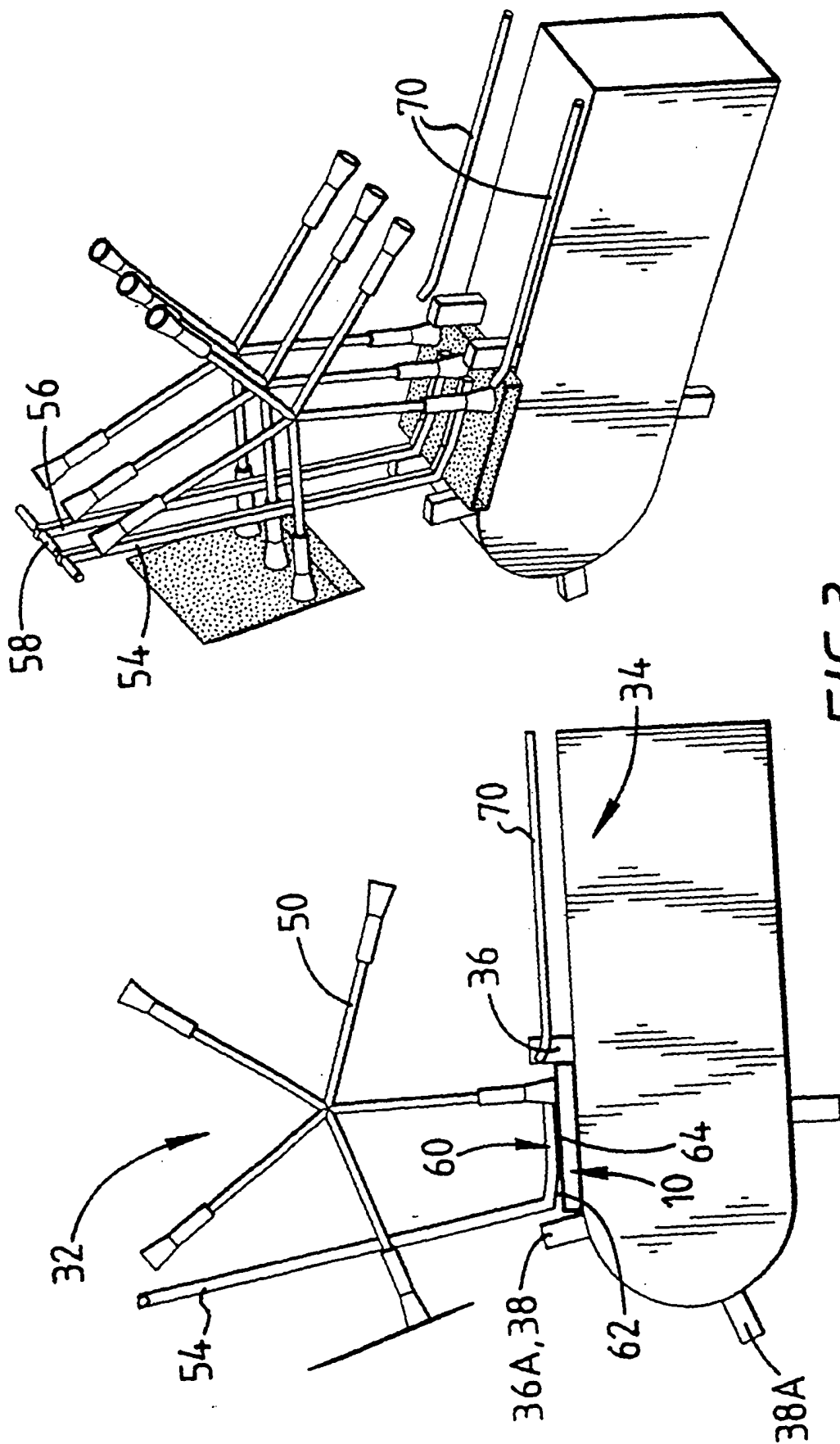


FIG. 1







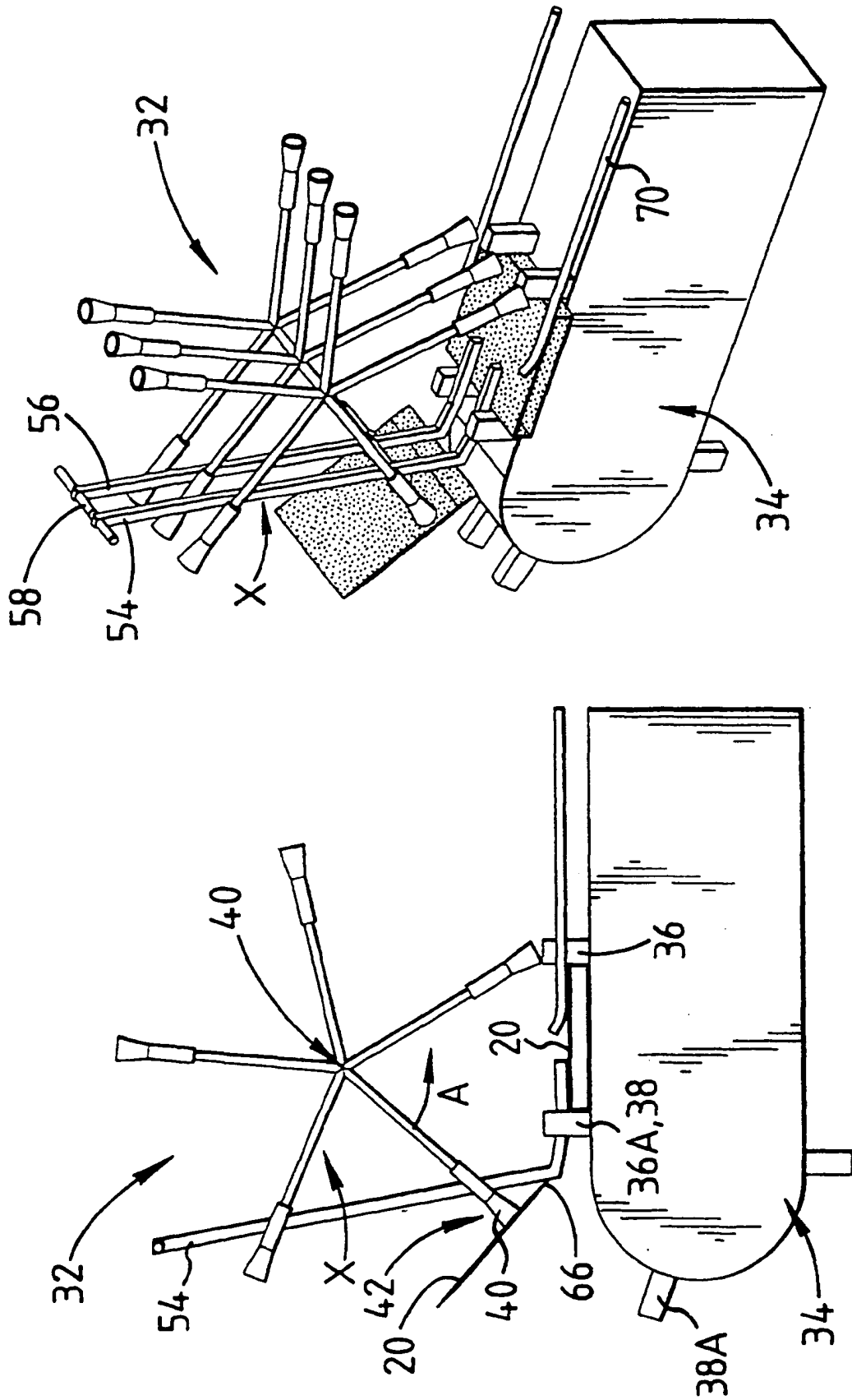


FIG. 4

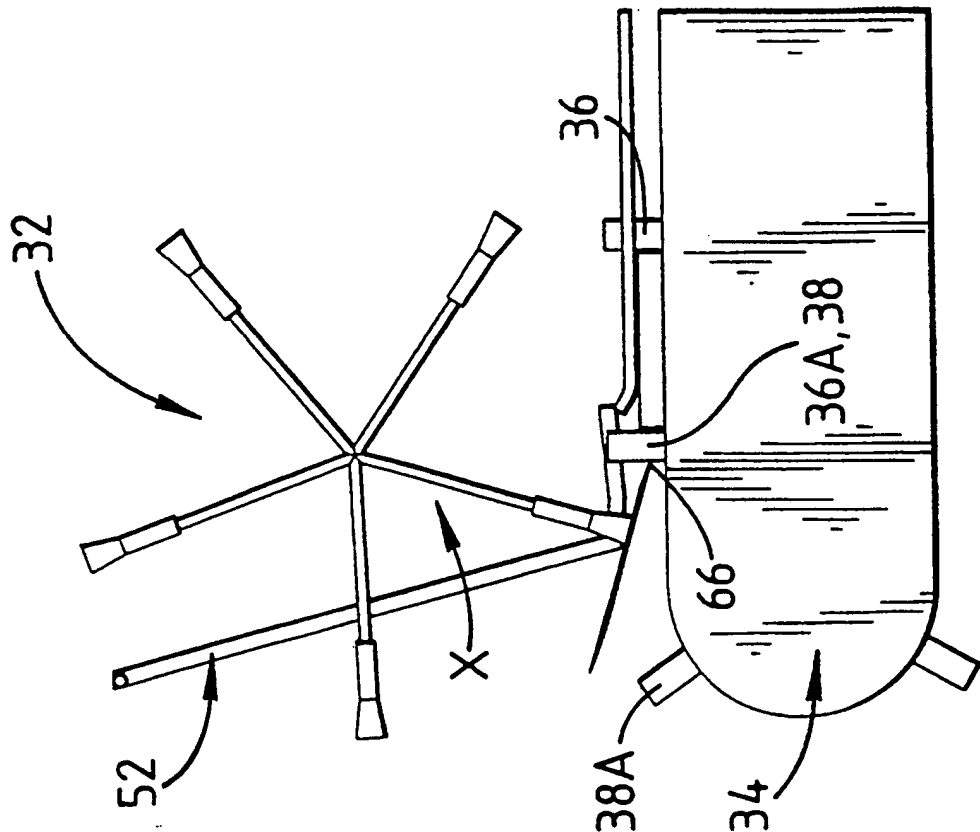
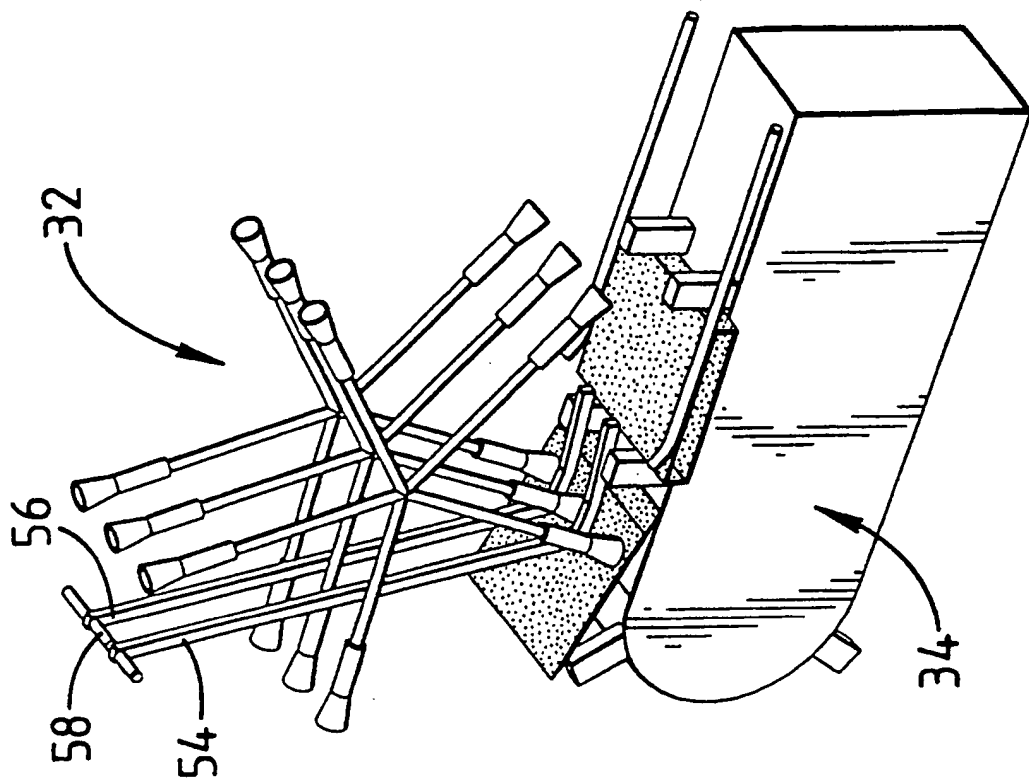


FIG. 5

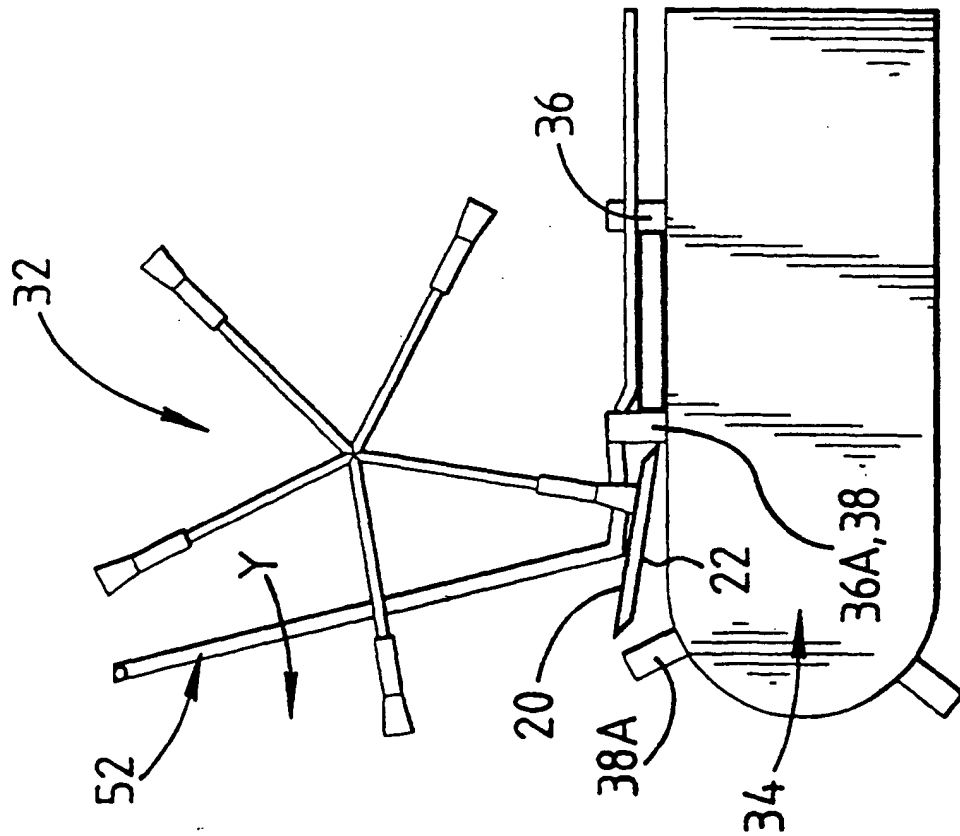
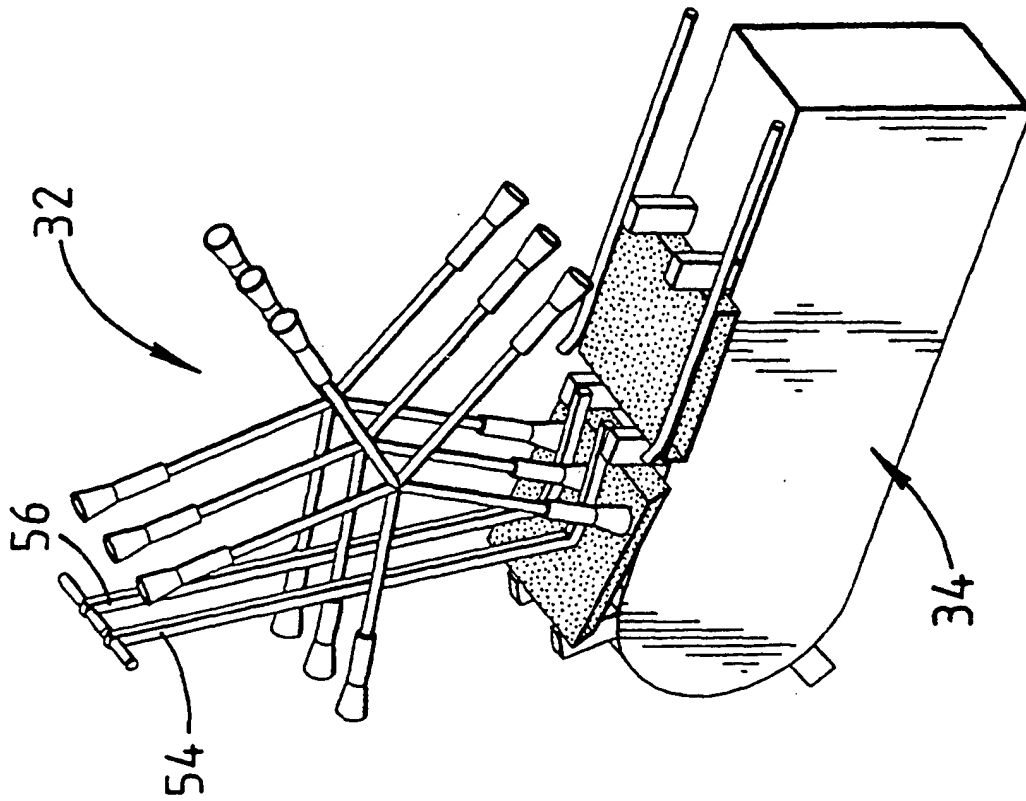
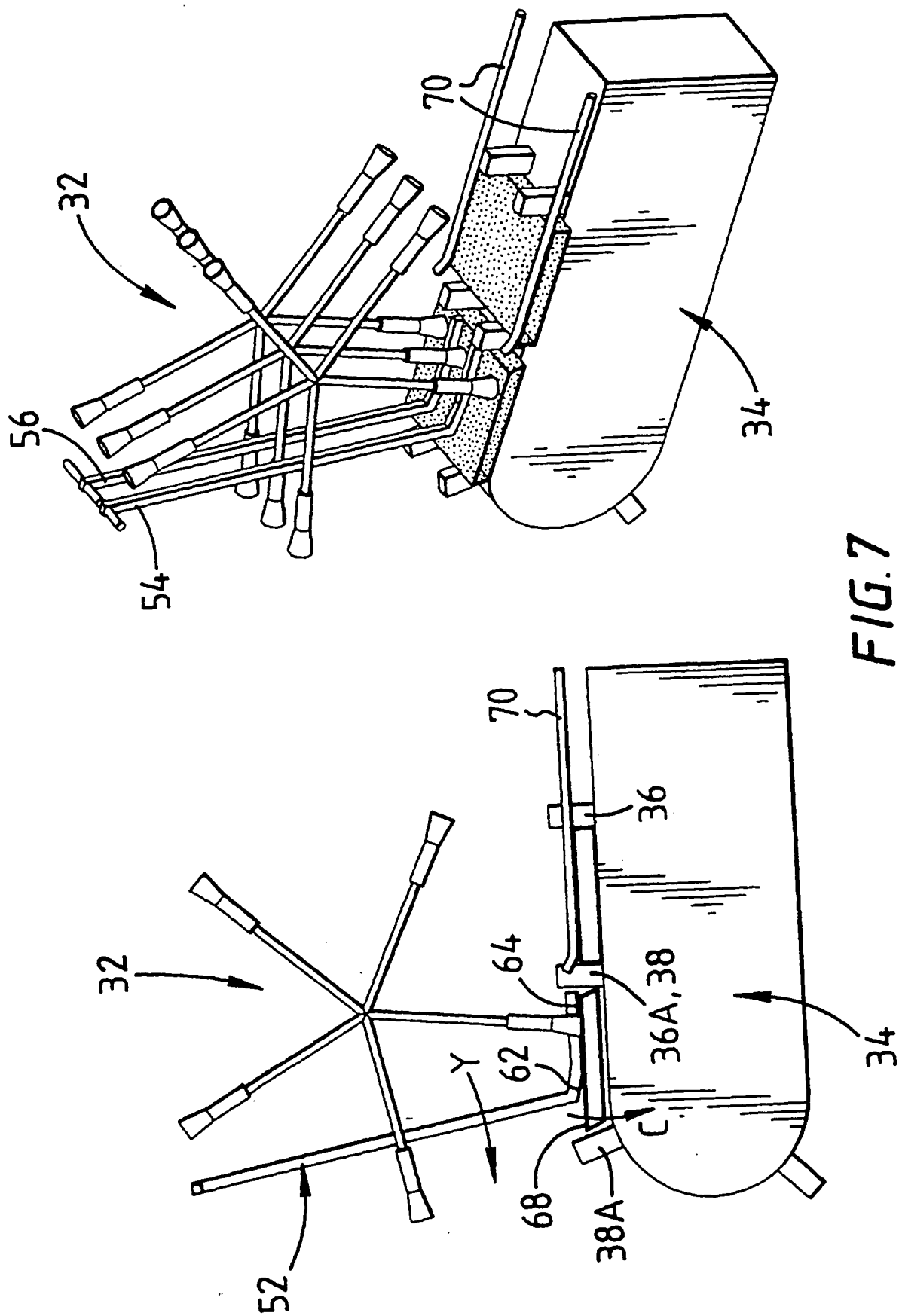


FIG. 6



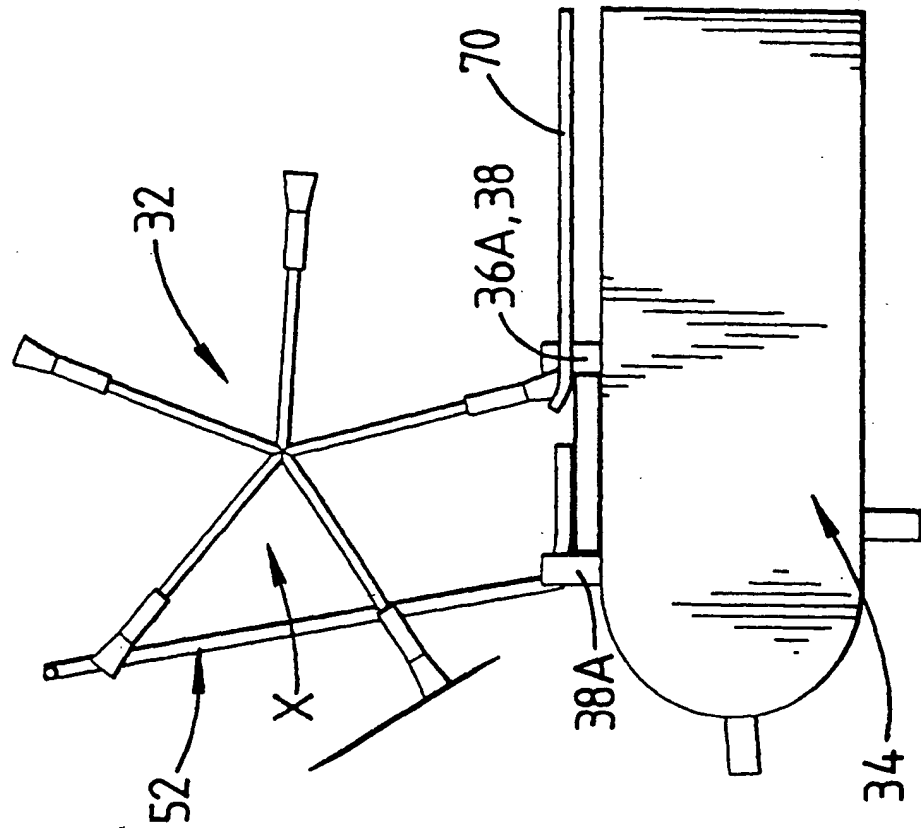
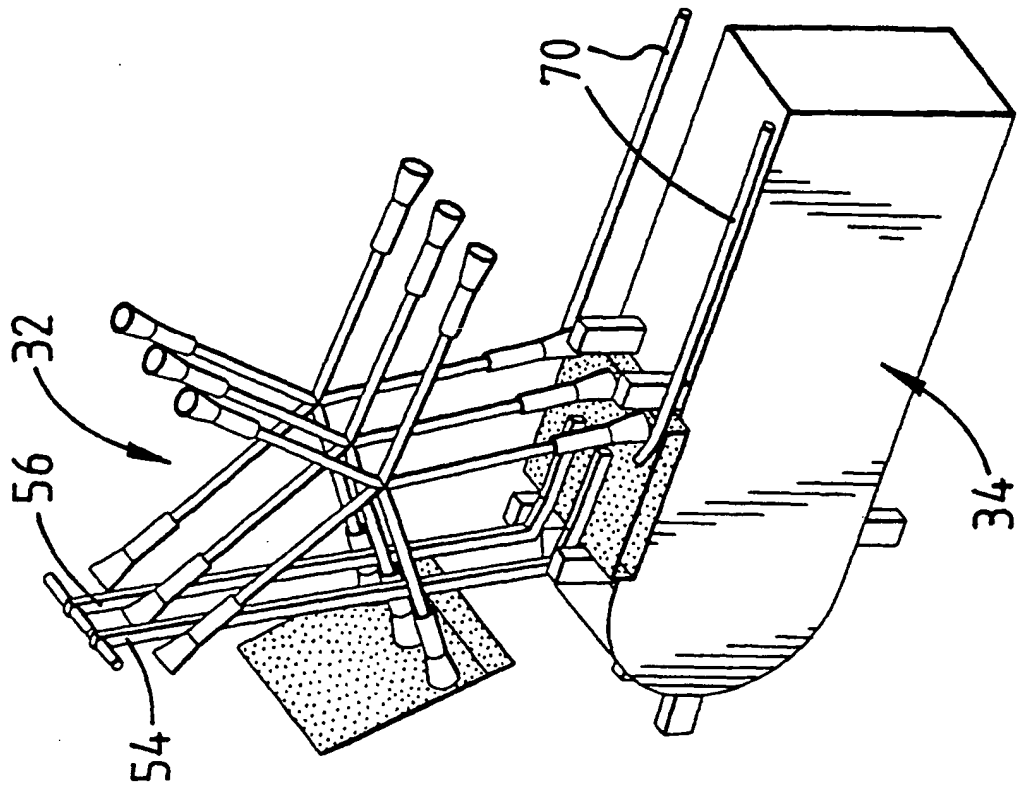


FIG. 8